

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. (Currently amended) Data processing apparatus for calculating an estimated time of arrival of a seismic or microseismic P or S wave at a sensor station, the seismic or microseismic P or S wave being generated by a seismic or a microseismic event, comprising a data processor that:
  - a) calculates an estimated time of origin for the seismic or the microseismic event generating the P and S waves, based on a P to S wave velocity ratio and picked arrival times of the P and S waves at a sensor station other than the one for which the estimated time of arrival of the P or S wave is to be calculated; and
  - b) calculates the estimated time of arrival of the P or S wave without knowledge of a location of the seismic or microseismic event, based on a P to S wave velocity ratio, the estimated time of origin of the event and, where the estimated arrival time of a P wave is to be calculated, a picked arrival time of the S wave at the sensor station for which the estimated arrival time of the P wave is being calculated or, where the estimated arrival time of a S wave is to be calculated, a picked arrival time of the P wave at the sensor station for which the estimated arrival time of the S wave is to be calculated.
2. (Previously presented) The apparatus according to claim 1, wherein said data processor calculates estimated arrival times for both the P and S waves at a sensor station.

3. (Previously presented) The apparatus according to claim 1, wherein said data processor is configured to calculate a plurality of estimated times of arrival of the P and/or S wave at a sensor station, based on a plurality of estimated times of origin for the seismic or the microseismic event calculated from the picked arrival times of the P and S waves at a plurality of sensor stations other than the one at which the estimated times of arrival are to be calculated.
4. (Previously presented) The apparatus according to claim 3, wherein the data processor is further configured to display the picked arrival times and estimated arrival times in relation to each other such that the clustering pattern of the arrival times can be analysed.
5. (Previously presented) The apparatus according to claim 4, wherein the data processor comprises a display for displaying information regarding the calculation of any particular estimated arrival time in response to the selection of said estimated arrival time by a user.
6. (Previously presented) The apparatus according to claim 1, wherein said data processor calculates one or more estimated times of arrival for the P and/or S waves at each sensor station in a network of sensor stations, wherein for each sensor station the necessary estimated time or times of origin are calculated from the picked arrival times of the P and S waves at one or more of the other stations in said network.

7. (Previously presented) The apparatus according to claim 1, wherein the data processor receives seismic data from the sensor stations and picks arrival times for the P and S wave at each sensor station based on said received seismic data.
8. (Previously presented) The apparatus according to claim 1, wherein, with a number of possible arrival times for a wave at a sensor station, the data processor processes said possible arrival times with any estimates calculated for the arrival time of said wave at said station in order to determine an arrival time of said wave at said station.
9. (Previously presented) The apparatus according to claim 8, wherein the data processor is configured to select or modify one of said possible arrival times in order to arrive at a final picked arrival time based on said determination.
10. (Previously presented) The apparatus according to claim 8, wherein the data processor processes which of the possible arrival times should be selected or modified in order to arrive at a final picked arrival time based on said determination.
11. (Canceled)
12. (Currently amended) A method of calculating an estimated time of arrival of a seismic or microseismic P or S wave at a sensor station, the seismic or microseismic P or S wave being generated by a seismic

or a microseismic event, said method comprising the steps of:

- a) calculating an estimated time of origin for the seismic or the microseismic event generating the P and S waves, based on a P to S wave velocity ratio and picked arrival times of the P and S waves at a sensor station other than the one for which the estimated time of arrival of the P or S wave is to be calculated; and
- b) calculating the estimated time of arrival of the P or S wave, based on a P to S wave velocity ratio, the estimated time of origin of the event and, where the estimated arrival time of a P wave is to be calculated, a picked arrival time of the S wave at the sensor station for which the estimated arrival time of the P wave is being calculated or, where the estimated arrival time of a S wave is to be calculated, a picked arrival time of the P wave at the sensor station for which the estimated arrival time of the S wave is to be calculated, wherein the estimated time of arrival is calculated without knowledge of a location of the seismic or microseismic event.